Kentucky Geological Survey
UNIVERSITY OF KENTUCKY

Kentucky Geology

Earth Resources—Our Common Wealth

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Kentucky Geological Survey
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Our mission is to increase knowledge and understanding of the mineral, energy, and water resources, geologic hazards, and geology of Kentucky for the benefit of the Commonwealth and Nation.

In this issue

First state to have complete digital geologic map coverage

Milestone in the history of geologic mapping in Kentucky

On April 30, the Kentucky Geological Survey celebrated a milestone in the history of geologic mapping. KGS Director Jim Cobb announced that all 707 printed geologic quadrangle (GQ) maps (1:24,000 scale, 7.5 minute) for Kentucky have been converted into digital format. This is an unprecedented accomplishment in the United States, because no other state of large size has complete detailed geologic map coverage, and no other state has detailed geologic map coverage in digital format.

The digital conversion of GQ's began in 1996 with the establishment of the KGS Digital Geologic Mapping Program (www.uky.edu/kgs/mapping/mapping.html). The National Cooperative Geologic Mapping Act of 1992 and subsequent reauthorizations provided funding on a 50:50 basis by KGS and the U.S. Geological Survey. Oversight of the program by KGS and the USGS has ensured that the highest standards have been maintained in digitizing the data, that appropriate metadata are provided to assist the users, and that products are inexpensively and broadly distributed to the public.

Randall Orndoff, Associate Program Coordinator of the National Cooperative Geologic Mapping Program of the USGS, commented, "The completion of geologic mapping by the Kentucky Geological Survey and USGS of the entire state in 1978 was a model of State and Federal cooperation. Today, the digitizing and updating of the 707 geologic quadrangle maps are a testament of the dedication of the Kentucky Geological Survey to serve the societal needs of the state."

Susan Bush, Commissioner of the Department for Natural Resources, Kentucky Environmental and Public Protection Cabinet, commended KGS: "I applaud the dedicated staff at the KGS for reaching such a momentous milestone. For the first time in our history, decision-makers across Kentucky will have instant access to critical information that will allow them to make well-informed decisions regarding future development and protection of our natural resources." Commissioner Bush commented: "The valuable service the KGS has provided and continues to provide to Kentuckians is vital to wise and informed economic growth and the stewardship of our abundant natural resources. I consider them valuable partners in mapping Kentucky's future and am very proud of the world-class work they perform."

The conversion of the GQ's into digital format has numerous benefits. Many GQ's are out of print. The new digital data permanently preserve this valuable geologic information. Once the GQ's have been digitized, the newly created vector data are compiled and organized in databases and distributed on CD-ROM or through access on the World Wide Web. The digital format allows users to manipulate and analyze the data, and is particularly useful in geographic information systems.

Ron Gilkerson, chair of the KGS Advisory Board, and president of GRW in Lexington, Ky., noted that "having this data in digital format allows for easy and inexpensive distribution by electronic means. This greatly benefits the many varied users and allows for great flexibility in the use of the data. Users can easily create new maps and new data by overlaying different maps. The potential additional uses are virtually limitless."❖

"The Kentucky Geological Survey has been in the vanguard of bringing Kentucky into the digital age. Information that would have taken weeks of research and several thousand dollars to obtain on a project-by-project basis is now available at our fingertips."—Susan Bush, Commissioner of the Department for Natural Resources, Kentucky Environmental and Public Protection Cabinet

Director's Desk

I often attend meetings where the activities of other state geological surveys are discussed. It occurred to me recently that KGS is as close to being a full-service geological survey as you will find anywhere in the Nation. What makes us full service? We have a broad spectrum of research and public-service activities. Issues of importance to the people of Kentucky include seismic hazards, karst hydrology, groundwater supply and protection, geology for planning, coalbed methane, CO_2 sequestration, energy resources, geologic mapping, and mineral resources. We have active projects in all these research areas.

To the best of my knowledge, we provide free access to more raw data on our Web site than any other state geological survey. Our Web site has

- Publications and maps
- Oil and gas records
- Water well and spring records
- Seismic records
- Data on coal quality and resources
- Descriptions of well cores and cuttings
- Digital geologic map data and other map resources
- Earth science educational materials
- General geologic information
- Paleontologic information

We have developed online tools to search for and retrieve publications, maps, and resource information for Kentucky. Copies of many of our publications are available free online as PDF files. In addition, our geologists continue to travel throughout Kentucky to assist people who have had problems with sinkholes, landslides, and other geologic phenomena.

We're still engaged in traditional publishing and map-making. In the past 5 years, we have published almost 100 titles, including five 1:100,000-scale, 30 x 60 minute geologic maps. We have developed an innovative series of maps with generalized geologic information for land-use planning. We have developed karst dye-trace maps in cooperation with the Kentucky Environmental and Public Protection Cabinet, coal resource maps in cooperation with the U.S. Geological Survey, and earthquake maps in cooperation with the Central United States Earthquake Consortium.

Each year our staff, on average, responds to 12,000 requests for information or assistance. We have excellent support facilities (such as the Well Sample and Core Library, analytical laboratory, and Western Kentucky

Office at Henderson). A new repair facility and garage for seismic equipment is being constructed at our Western Kentucky Office. The Kentucky Seismic and Strong-Motion Network is the largest in the eastern United States; it has 10 strong-motion stations that provide real-time seismic records, which are posted on our Web site.

What makes us full service? First, our commitment to use our knowledge and skills to help the people of Kentucky. Second, our commitment to distribute our publications, data, and maps on the Web as broadly, easily, and inexpensively as possible.

As always, I appreciate e-mails and suggestions about our programs and products. Please feel free to contact me by phone or e-mail. ❖

James C. Cobb

Seismic hazard maps for western Kentucky

The Tri-State Mapping and Hazards Assessment Group met in **Evansville, Ind.,** April 7. Established in September 2003, this group from the U.S. Geological Survey, state surveys, Central United States Earthquake Consortium State Geologists, educational institutions, and local government is cooperating in a 5-year program to map the Ohio Valley sediments in the **Evansville, Henderson,** and **Owensboro** areas and develop seismic hazard maps for this region. The group wants to develop a better understanding of the geology and seismic risks that are particular to the region. Researchers are hoping to secure funding for drilling, seismic investigations, modeling of depositional environments, collecting geotechnical data, remote sensing, and educational outreach.

With funding from the STATEMAP program, KGS is mapping unconsolidated materials along the Ohio River in Kentucky. KGS geologists are also assisting USGS geologists who are mapping areas in Indiana to expand previous mapping completed by the Indiana Geological Survey.

Geologists at KGS are developing subsurface information incorporating boreholes, water wells, and petroleum tests. By mapping the surface and developing subsurface information and gathering geotechnical information such as shear-wave values, the KGS and other research programs will develop maps that will illustrate the risks to people and property from earthquakes within the New Madrid and Wabash Valley Seismic Zones.

The work of this tri-state group is an example of the continuing cooperation among geologists at KGS, the Illinois State Geological Survey, and the Indiana Geological Survey to facilitate programs that benefit the tri-state region.

For more information, contact **Dave Williams,** manager of the Western Kentucky Office at Henderson, at 270.827.3414 or by e-mail at williams@uky.edu. ❖

IN FOCUS

Revolutionizing Public Service—The KGSGeoPortal

Carol L. Ruthven, Douglas C. Curl, Daniel I. Carey, and Gerald A. Weisenfluh
May 2004

Instant access to map-based geologic data, online databases, and publications

An old but true adage states that "Time is money." This has never been more true than today in our digital age of high-speed computers and broadband Internet access. People have come to expect and even demand instant results when searching for and retrieving information and data from the Web. Although there is a wealth of information, you can easily get lost in the myriad of online information. People want to be able to find information and retrieve data quickly, efficiently, and without hassle. This can be a challenging expectation to meet.

This challenge has been met by the staff of the Kentucky Geological Survey. Geologists at KGS, like the citizens they serve, want to be able to readily search for and access data and information. Frequently this information is required for a specific geographic location or area (for example, oil and gas well locations in Pikeville; water well locations in metropolitan Louisville; coal beds in Pike, Letcher, and Harlan Counties; all the publications with geologic information about Paducah).

KGSGeoPortal

The Survey has numerous databases and thousands of maps and publications that can be accessed online. Other State agencies also maintain online maps. In the past, citizens, researchers, consultants, and others would have to access numerous databases maintained by several different agencies in order to gather the information they need. This has changed with the creation of a new tool referred to as the "KGSGeoPortal: Gateway to Online Maps, Databases, and Publications for Kentucky" (kgsweb.uky.edu/main.asp). The portal provides easy access to most of Kentucky's online maps and databases. Its main feature is a user-friendly geographic search tool that focuses a base map on the user's area of interest.

Enter the KGSGeoPortal
Gateway to Online Maps, Databases, and Publications for Kentucky

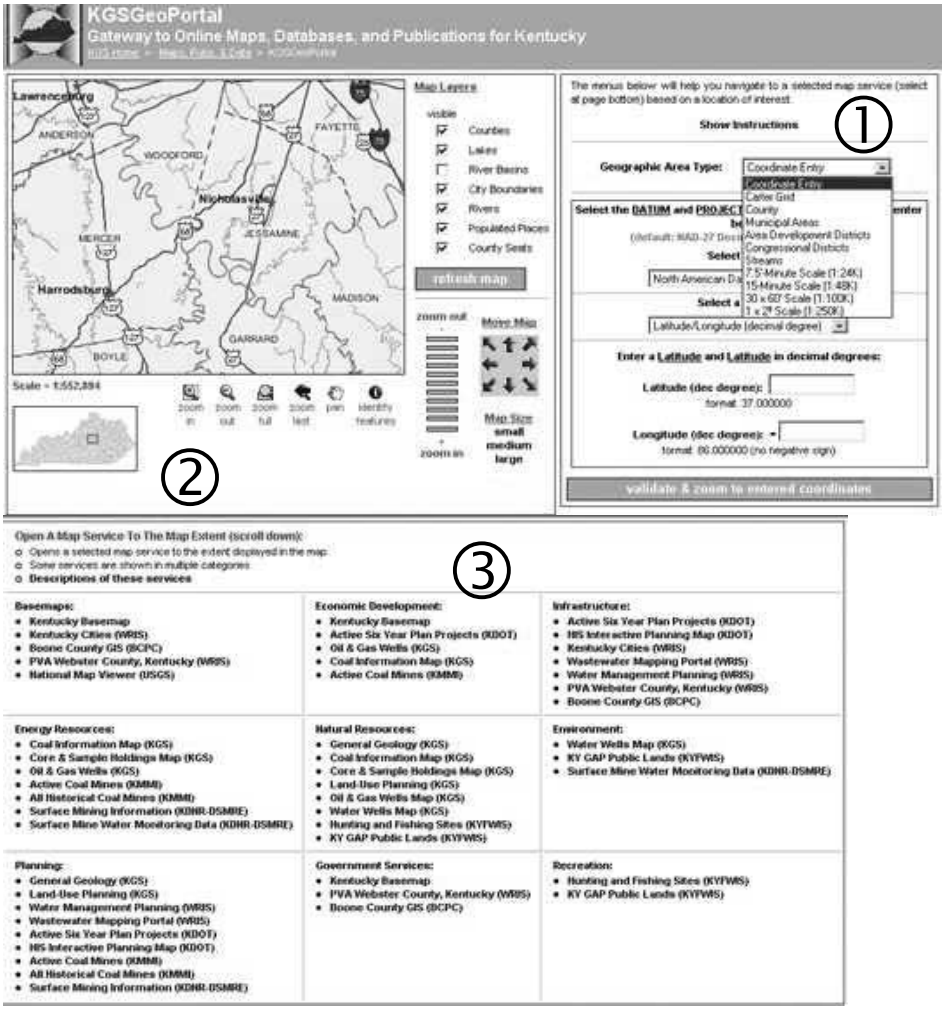
Citizens and customers often require the assistance of a KGS staff member to help them identify and retrieve the information or data they need. In the past, this assistance was provided on an individual basis by a KGS geologist responding to an inquiry. This traditional approach to providing public service was time-consuming for both KGS and the customer being assisted. If "time is money," this process was costly and inefficient. It also meant the public could only be assisted during normal business hours. This process is greatly simplified and made much more efficient with the creation of the KGSGeoPortal. Customers can now use the portal to access data and information from multiple sources on a 24-7 basis any time, at their convenience, from any location with an Internet connection (office, home, library, etc.).

The KGSGeoPortal provides one-stop shopping at a single location. You can specify a geographic area of interest and quickly access links to other sites that have map-based data and online publications and information about that particular geographic area. It provides links to numerous sites with Web-based information about Kentucky's geology, landscape, environment, energy and water resources, and infrastructure. You can readily access interactive maps, tabular databases, and online publications, as well as link from one online service to other services at the same time.

Who can use the KGSGeoPortal?

This site is useful to anyone who has Internet access and is interested in locating information about Kentucky's energy resources (oil, natural gas, and coal), coal mines (historical, active, and surface), water wells, wastewater projects, water management planning, general geology, and land-use planning. Follow a few simple steps to get the data and information you need.

The KGSGeoPortal is a revolutionary new system for accessing geologic data, maps, and publications for Kentucky. It's a convenient clearinghouse for map-based data and online databases and publications about geology in Kentucky.



①Information can be searched for on a geographic basis by specifying a county name, coordinate location, Carter grid cell, municipal area, area development district, congressional district, or stream name.

②The map location can be verified and refined using the pan or zoom tools.

③Internet map services and databases developed by State and local agencies are linked together on the KGS GeoPortal, and links to each are listed in a convenient menu. You can access any one of 29 online map services and databases and view all the data available for an area of interest. For example, with two clicks of a mouse, you can move from one area of interest on one map (perhaps a map of soils and geology) to the same area of interest on another map (say, a map of abandoned mine areas).

You can simultaneously examine the data and maps in adjacent windows on the KGSGeoPortal in order to identify relationships and patterns. This capability is the basic concept of a geographic information system (GIS).

Although this service-to-service linking capability of the KGSGeoPortal is a particularly powerful tool for anyone familiar with GIS and ESRI applications, you don't have to be knowledgeable about GIS to use the portal and take full advantage of the tools it provides.

Additional links will be made to other relevant online databases and interactive mapping services as they become available. These additions will enhance the service-to-service linking capability of the KGSGeoPortal and enhance the quality of public service made possible through the site.

Who contributed to the KGSGeoPortal?

The KGSGeoPortal was developed at KGS with assistance from other State organizations and persons. Coordinate conversion is supported by the Kentucky Geographic Toolbox, developed by Bryan Bunch of the Kentucky Environmental and Public Protection Cabinet. The Kentucky Infrastructure Authority played a central role in promoting and developing Internet mapping services in Kentucky. Other agencies contributed to the Web-based services that are accessible through the KGSGeoPortal. A list of these agencies can be found by clicking on the "more information" link at kgsweb.uky.edu/main.asp.

For additional information, contact **Doug Curl** at 859.257.5500 ext. 140 or by e-mail at doug@uky.edu or contact **Jerry Weisenfluh** at 859.257.5500 ext. 114 or by e-mail at jerryw@uky.edu. ❖

The KGSGeoPortal is one of a suite of tools and services being developed in Kentucky to help citizens gain access to geospatial (map-based) information. It complements the services provided by the KYGeonet, a similar Web service that focuses on keyword searching for maps, data sets, and online information. Together these tools give users flexible options for finding the information they need in the easiest possible way.

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Visit the KGS online catalog of publications, databases, and Internet mapping service at kgsweb.uky.edu/findpubsmain.asp

Public Information Center: 859.257.3896 or 1.877.778.7827

Spotlight on new publications

Water supply in eastern Kentucky

A new Report of Investigations by **Robert Andrews, David Wunsch, James Dinger,** and **Glenn Dunno,** "Using Remote-Sensing and Inclined Drilling to Locate High-Yield Water Wells in the Eastern Kentucky Coal Field," discusses the results of a multiyear project to use geologic and remote-sensing technologies to identify areas that could yield large amounts of groundwater as a potential source of municipal water supply.

The authors developed a method using lineament analysis in conjunction with inclined exploration boreholes to identify subsurface fractures in the Eastern Kentucky Coal Field. Their research indicated that wells in eastern Kentucky that provided significant amounts of water (more than 30 gallons per minute) were usually near fractures or faults, which may be expressed as linear features on aerial photographs, satellite imagery, and topographic maps. Wells were drilled to intersect these fractures. Drilling at six sites resulted in four production wells with yields that were greater than the yields of 95 percent of the wells drilled in the Eastern Kentucky Coal Field.

The report, which is available for $5, will be of interest to water planning officials and hydrogeologists. It is also available for free as a PDF file at kgsweb.uky.edu/main.asp. For more information, contact **Jim Dinger** at 859.257.5500 ext. 163 or by e-mail at dinger@uky.edu.❖

Looking Back

The first flowing oil well in Kentucky

Did you know that the first oil well in Kentucky was drilled 41 years before the birth of the modern oil industry? An oil well completed in 1859 by Colonel Edwin Drake on Oil Creek near **Titusville, Pa.,** is often cited as marking the birth of the modern oil industry. But 41 years earlier, in 1818, a well known as the "Father of American Flowing Wells" was drilled by Martin Beaty along a tributary of the Big South Fork now known as Oil Well Branch in **McCreary County.**

In 1818 Beaty contracted with Marcus Huling and Andrew Zimmerman to drill a well. A hole 9 feet square was dug 10 feet into the dirt and rock, and then cribbed. Using a spring pole rig, a 3-inch-diameter hole was dug from the bottom of the pit to a depth of about 200 feet, where crude oil began to flow to the surface. The well initially flowed oil at a rate estimated to be 100 barrels per day. It filled the meager pit, spilled into the creek, and covered the waters of the Big South Fork for miles.

Huling and Zimmerman arranged with Beaty to manufacture some wooden barrels and a boat, a kind of dugout known as a "perve," to which the barrels of oil would be strapped. They hired two local fishermen, Pierson Watson and John Spradling, to guide their contraption down the river to market. At the narrows at Devil's Jump, disaster befell the crew, and both the oil and the boat were lost. A second attempt by boat was also unsuccessful, so Huling and Zimmerman decided to haul the oil overland.

Oil was sold in the surrounding area, and Huling even sent 2,000 barrels to Europe. Some of the oil made its way to the manufacturers of British Oil, Seneca Oil, Mustard Liniment, and others. The cost of hauling oil from that rugged and roadless region would eventually prove to be unprofitable, however.

Today the 1818 Beaty well can be found as a capped pipe with a marker along a trail in the **Big South Fork National River and Recreation Area.**❖

—Brandon Nuttall

Blaine Cecil honored as the second Donald C. Haney Distinguished Lecturer

On February 26, **C. Blaine Cecil,** a research geologist with the U.S. Geological Survey in Reston, Va., gave the second Donald C. Haney Distinguished Lecture. In his talk, "Travels in Indonesia: A Potpourri of Geology and People," he explained how areas in tropical Indonesia and Australia provide an analog for tectonic, eustatic, and climate controls on the origin of coal and coal-bearing strata. He explained why the study of peat in Indonesia contributes to an improved understanding of the origin of coal in Kentucky.❖

KGS 2004 Distinguished Service Award

Paul Howell, a geologist with the U.S. Natural Resources and Conservation Service, received the 2004 KGS Distinguished Service Award on April 30. In recognizing his achievements, State Geologist Jim Cobb commended Howell for his lifelong dedication to promoting a better understanding of geology and its impact on the lives of Kentuckians.

In June 1967, Howell became the U.S. Department of Agriculture–Soil Conservation Service state geologist for Kentucky. His early work focused on the design of multipurpose watershed structures. During the past 20 years, he has traveled across the state, teaching people about the rocks they live on and how to build their homes, ponds, reservoirs, and other facilities to avoid geologic hazards. During his 37 years of service, his geologic expertise has been widely respected.❖

People and places

Matt Crawford, a geologist in the Energy and Minerals Section of KGS, was elected to the Friends of McConnell Springs Board of Directors for 2004. McConnell Springs is a nature preserve and historical site owned by the Lexington-Fayette Urban County Government and operated by the Division of Parks and Recreation (www.lfucg.com/ParksRec/McConnellSprings.asp).❖

KGS mailing list

Would you like to receive the KGS newsletter and announcements of meetings and new publications? Please call us at 859.257.5500 ext. 128 or send an e-mail message to **Carol Ruthven** at cruthven@uky.edu—simply type "Electronic-Mailing List Addition" in the subject line of your message, type your mailing address and phone and fax number in the message—and we will include your name and address in our mailing list.❖

Calendar of events

- **September 16:** Jeffrey R. Keaton, 2004 Jahns Distinguished Lecturer, University of Kentucky, Lexington
- **September 28–29:** 11th Kentucky GIS Conference, Lexington, Ky., ogi.ky.gov/2004conference.htm
- **October 1–3:** 2004 Binghamton Geomorphology Symposium, Lexington, Ky., www.uky.edu/AS/Geography/Binghamton04/
- **October 3–6:** Eastern Section AAPG, annual meeting, Columbus, Ohio, www.ohiodnr.com/geosurvey/aapg04.htm
- **October 10–16:** Earth Science Week 2004, "Living on a Restless Earth," www.earthsciweek.org
- **October 21–23:** Kentucky Society of Professional Geologists annual fall field conference, Bighill roadcut, Madison County
- **November 7–10:** Geological Society of America annual meeting, Denver, Colo., www.geosociety.org/meetings/2004
- **November 17:** GIS Day, www.gisday.com❖

The Department of Geography, together with the Department of Geological Sciences and the Kentucky Geological Survey, will host the 35th annual Binghamton Geomorphology Symposium at the University of Kentucky, October 1–3. The theme of this year's symposium is "Weathering and Landscape Evolution."

The Binghamton Geomorphology Symposium series, so named for its origin at Binghamton University in 1970, is the oldest, longest-running, and most prestigious geomorphology specialty conference in the world. Proceedings of the BGS contain some of the most fundamental and widely cited contributions to the earth sciences of the past three decades. Poster presentations are open to anyone, but speakers (whose papers are published in the proceedings) are invited. A distinguished international list of 18 of the world's top weathering specialists will be speakers at the 2004 symposium in Lexington. Additional information is available at www.uky.edu/AS/Geography/Binghamton04/. For further information, please contact Jonathan Phillips at 859.257.6950 or by e-mail at jdp@uky.edu.❖

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